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BY ROBERT SIBLEY.

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BY H. N. SESSIONS.

UP-TO-THE-MINUTE SELLING METHODS.

BY S. C. BRATTON AND G. D. MANTLE.

PERIODICAL DIVISION 1916 OCT 27

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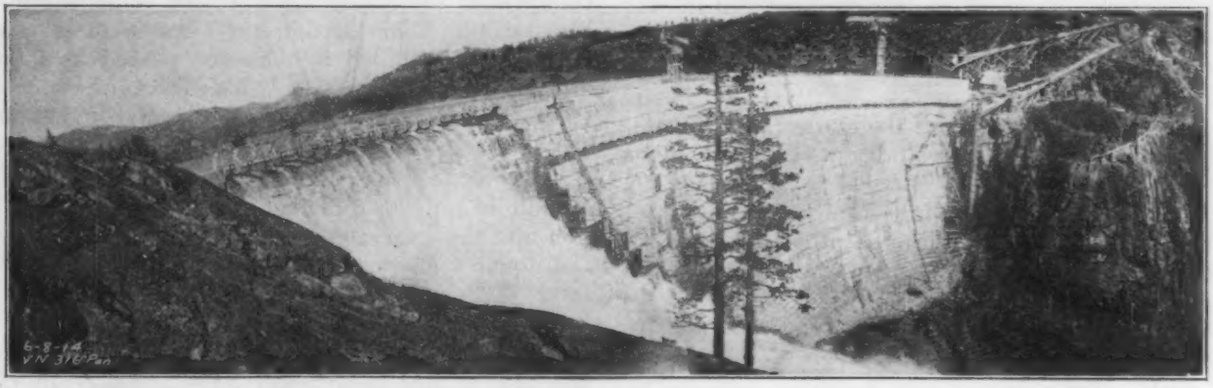


Spaulding Dam showing Granite Ledge to the Right, which has been Tunneled for the Passage of Bear River Canal Waters.

THE BEAR RIVER CANAL

BY ROBERT SIBLEY.

Emigrant Gap is a breathing point for main line trains in their journey through the snow sheds of the Southern Pacific Company, as these trains trail their way over the high Sierras of Central California. From this breathing point the traveler may easily follow with his eye the great mass of waters impounded by Lake Spaulding and the snow-capped area from which this artificial lake draws its storage supply.

As set forth in the issue of the Journal for September 30, 1916, this deep impounded body of water is to rise 305 ft. above the flooring of the granite gorge upon which it maintains its footing. The ultimate storage capacity will be 97,000 acre feet.

A tunnel has been driven through the almost perpendicular granite wall shown to the right in the picture of the Spaulding dam in order to start the waters reservoired in this lake on their journey toward hydroelectric power development.

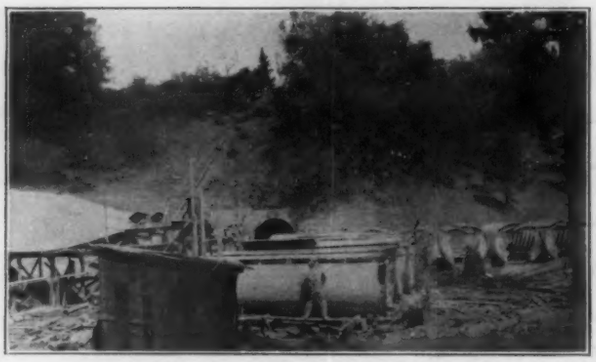
These waters, originating in the drainage area of the South Fork of the Yuba River, are conveyed through the Drum Canal over the pass which separates this drainage area from that of the Bear River and are finally dropped through the Drum power plant into the Bear River. Some miles below this point, near Colfax, California, they are again diverted in order to drive the wheels of the Halsey and Wise power plants, described in September 30th issue of the Journal. This artificially created channel is known as the Bear River Canal.

This canal has a carrying capacity of 350 ft. per second, is twenty-four and one-half miles in length, and is laid on an average grade of one foot per thousand. It consists for the most part of earth work. Just above Auburn, however, the canal is turned through a series of three 8 ft. tunnels before discharging into the forebay of the Halsey power house. This forebay has a capacity of about 200 acre feet, and a surface area of 12½ acres. Earth embankments constructed from the excavated material have been made use of to create this reservoir.

The water, under a head of 342 ft., is then dropped through the Halsey power house into a small branch of Dry Creek. The penstock pipe is composed of 1773 ft. of wood stave and 1182 ft. of steel piping.

Immediately below the Halsey power house, a regulating dam passes the water through tunnels and ditches into the Rock Creek reservoir. From this point the water is conveyed to the forebay for the Wise power house, which has a capacity of about 38 acre feet and a surface area of four acres. From the forebay a penstock pipe 9800 ft. long drops the water through the Wise power house under a static head of 519 ft.

Of this penstock 1106 ft. is wood stave pipe, 96 in. in diameter; 463 ft. is tunnel driven through solid rock, and the remainder steel rivetted pipe, 84 in. in diameter at the tunnel end, finally decreasing to 66 in. at the turbine connection. Due to the extreme length



Collapsible Circular Forms for Concreting Tunnels.

Frame Work for Installation of Novel Multiple Arch Dam at Rock Creek.

and diameters installed, the friction head is quite high so that for the design of the turbine unit 510 ft. was assumed instead of the 519 ft. head actually installed. This effective head drops to 475 ft. under maximum load conditions.

The hydraulic features of the entire Spaulding development cover a strip of territory more than 30 miles long and at its upper end more than 20 miles wide, portions of the water coming from an elevation of more than 12,000 ft., and the final utilization is at an elevation less than 500 ft. above sea level. Its ultimate development will be the production of nearly 175,000 electrical horsepower and the supplying of artificially stored waters for an irrigation system covering more than 20,000 acres.

There are many features in the construction of the Bear River Canal that are interesting and instructive to know.

At the Rock Creek reservoir, mentioned above, a multiple arch dam 35 ft. in height is being erected. This dam is ultimately to have a height of 55 ft. Its unusual feature of design, which is the creation of the civil engineering talent of the Pacific Gas & Electric Company, is the freedom of motion that is given to each arch in order that it may properly adjust itself to varying strains and stresses that it may be required to carry. Each slanting arch being thus free in itself rests upon its own individual support. The connection is sealed by the pressure of water upon the arch, thus making it water tight.

The method of concreting certain portions of tunnels encountered in constructing the canal is unusual and novel. A series of cylindrical forms were constructed so that the form could be rendered of smaller diameter than the tunnel bore desired. This collapsible, adjustable arrangement is shown in the illustration. Upon setting the form in place, a concrete mixer installed in the open passed its mixture into a pipe under pressure, which forced the pipe contents to be deposited in the side walls of the tunnel at any place desired by the operator.

In the design of the ditch proportions, the water section is built for the most part in the excavated portion and the excavated material made to serve as an additional safety embankment against possible disaster.

Practically every type of conduit is used in one place or another in the construction of the canal. For instance, at one point open ditch is observed to be followed by semi-circular steel fluming which again serves a masonry lined run of canal. At another point the water passes from a forebay into wood stave piping, then through two pressure tunnels—concrete lined—again emerging into wood stave piping which finally serves the heavy steel riveted penstock piping that delivers the water to the power house wheels.

In the building of the forebay tram-work is largely relied upon for the hauling of the excavated material and its depositing upon the dam embankments. For excavating the material and loading it upon the wagons the steam shovel has been found useful and efficient.

The material that is excavated to form the earth dam embankments is first thoroughly wet down and later rolled solid with heavy cylindrically shaped rollers, followed by sheep's foot rollers, thus making the loose particles form one solid compact mass.

Typical Heavy Cut Section of Bear River Canal.

The Operation of Sheep-Foot Packers and a View of Sprays for Earth Settling.

The Pipe and Penstock Tunnel for the Wise Plant.

Leading from the forebay is 1106 ft. of 96 in. continuous woodstave pipe line, made from selected Oregon fir. For controlling the entrance of the water, an 84 in. motor operated butterfly valve is provided, this being one of a number of similar valves used throughout the development. The wood stave pipe line follows the ground contour, with an occasional cut to keep below the hydraulic gradient. It terminates in a tunnel, lined with reinforced concrete, which pierces a low ridge. The over burden is shallow, the sole object being to keep sufficiently below the hydraulic gradient to insure a full pipe under most severe operating conditions. The tunnel is 463 ft. in length and at its lower end is joined to a steel pipe line of varying lengths, as previously mentioned.

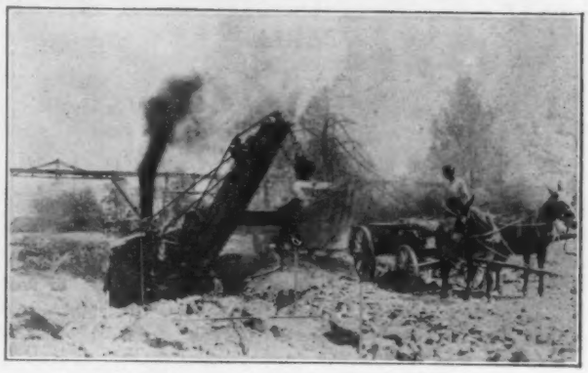
The last section of piping enters the power house and connects to the butterfly valve controlling the turbine. In laying this line, after a careful balancing of experiences with various types of construction found among the pipe lines of the company, it was decided to use the cheapest construction possible. A trench was dug roughly following the surface contour, of a depth to receive the lower half of the pipe. After riveting, the spoil was back filled. In discussion with the engineers, it was developed that no pipe line failure has ever occurred on the entire system, that could, even remotely, be traced to corrosion; also that insofar as service is concerned, pipe entirely covered or for its entire length in partial contact with the soil, gave better results than when supported on concrete piers, With pipes of such large diameter, the deformation from a true circle becomes important, reaching in some of the thinner sections as much as four inches. Under pressure the deformation is less, and the wall movement, when the pipe is emptied, is of sufficient magnitude to fracture the shoulders of the piers. For this reason pier construction was discountenanced. All lines are thoroughly covered with a coating of asphaltum paint at the time of laying, and at irregular intervals this coating is renewed where the line is exposed to the weather.

Because of the contour, a number of anchorages are necessary between the tunnel and the power house. These are of concrete, and of shape and size as dictated by the location. Where the walls of the pipe are ½ in. or more in thickness no slip joints are installed, but in the upper portion, four slip joints are provided. The policy of the company engineers leans toward slip joints and other pipe specials of structural materials only, as it is feared that sound steel castings cannot be had in the thin, varied dimensional parts required in a suitable slip-joint.

Further Details of the Halsey and Wise Power Plants.

For the sake of clearness, certain features mentioned in the Journal of September 30, 1916, concerning the Halsey and Wise Power Plants, will now be described in further detail.

The prime movers are there referred to as Allis Chalmers Water Wheel units. This on first thought gives the idea that they are impulse wheels. Such is not the case. They are Francis type turbines. The prime movers on the exciters are Pelton impulse



Steam Shovel Method of Earth Removal.

wheels. The beautiful method of assembling by heating and chilling the shaft as described was given careful consideration in the design of the machine and and no trobule whatever was experienced in handling the work.

The transformers are not in compartments separated from the main generating room. They set in pits as described in the text but there are no barriers between the transformer room and the main generating room or even between transformers. In other words, they set right out in the main generating room, but have a floor level lower than the main generating room floor. There is a passage-way between two of these transformers from the main generating room to the high tension switch comparaments, and there are concrete barriers on each side of this passage-way. This construction ,however, was not adopted with the idea of isolating the transformers, but more as a safety measure for the protection of persons passing between them and near high tension wires. The high tension oil switches are in separate cells or compartments, the different legs of the circuit being separated by concrete barriers.

The stepup transformers are connected delta on the low side and star on the high side to give 110,000 volts. Taps are brought out of the high tension winding for 60,000 volts between wires or 34,000 volts between each wire and grounded neutral. The line connecting from Halsey and Wise to Stockton is of steel tower design with suspension insulators and constructed for 110,000 volts. For the time being, it will be operated at 60,000 volts but this will eventually be increased to 110,000. Not only will the temporary volt service out of these two stations tie in with the Electra line at Stockton but it will also tie in with the existing 60 k.v. line running between Deer Creek and Alta power houses and Sacramento.

The main prime mover in Wise power house is a Francis type turbine of the Pelton-Doble design.

The relief valves for taking care of surges are actuated by the governor but through oil dashpots the time of operation of each can be adjusted so that on small or slow changes the relief valves are not opened. On sudden changes, however, the dashpot does not have time to act and therefore the relief valves are opened but close automatically within a pre-determined time limit.

ELECTRICAL REFRIGERATION IN A CAFETERIA.

BY H. N. SESSIONS.

(Description is here given of the method whereby constant low temperature is obtained for food preservation by means of electric refrigeration. The author is commercial engineer with the Southern California Edison Company, from whose house-organ this account is taken.—The Editor.)

The cafeteria, a Los Angeles creation, Spanish in name as most things typical of California, means to-day, as some people say, the last word in restaurant efficiency. Thrift, genius and enterprise have applied more science and system to the cafe, making the cafeteria an unbounded success. The cafeteria knows today its exact requirements for tomorrow—there are no uncertain peaks or surprising conditions to arise in its daily operation—all making for the adoption of scientific methods and machinery effecting economy. The result is an ample service at minimum cost.

The B. and M. Cafeteria at Night.

The B. & M. Cafeteria at Los Angeles is claimed to be the largest in the world and undoubtedly one of the finest—a one-story building covering 18,000 square feet, with basement and mezzanine. The normal seating capacity is 812, exclusive of the ice cream stand and soda fountain, and the daily average number of meals served since January 1, 1916, is 4950. Steady employment is being given to 160 men and women. No expense has been spared in architecture, furnishings and the latest appliances of every nature to make this institution beautiful, sanitary, comfortable, wholesome and economic. Much could be written in description of the many up-to-date innovations of this Los Angeles institution, but I will specialize with some details showing how thoroughly and efficiently its refrigeration is accomplished.

To save floor travel and time, various cooling cabinets or boxes, located at the most convenient places for serving the public, are stocked with different foods. A variation of a few degrees in temperature will cause certain foods to discolor and spoil. For perfect refrigeration and preservation of quality and flavor, each class of food is kept separately in a dry, clean atmosphere, at an unvarying degree of temperature necessitated by its own variety; for example—fish at 33 deg. F., berries at 38 deg. F., meat at 40 deg. F. and so on.

All of the foregoing requirements are met with the system of refrigeration employed by the B. and M. Cafeteria. Twenty-three separate refrigerated boxes and cabinets are used in this cafeteria, as follows:

Two ice cream cabinets, one on each side of double soda fountain. Each holds three five-gallon cans in calcium chloride solution maintained at 20 deg. F. by direct expansion;

One cabinet 3 ft. 6 in. by 2 ft. 3 ft. at soda fountain for salads, bottled water, etc., at 40 deg. F.;

Two cabinets 4 ft. by 2 ft. by 2 ft. 6 in., one at each of two butter counters, at 42 deg. F.;

Four cabinets 8 ft. by 2 ft. 6 in. by 2 ft., one at each of four serving counters for salads, creams, pastry, fruits, etc., at 42 deg. F.;

Four ice cream cabinets, one at each of four service counters, each with capacity for four five-gallon cans in calcium chloride solution held at 20 deg. F. by direct expansion;

One fish box in kitchen 5 ft. by 2 ft. 6 in. by 2 ft. 6 in. at 33 deg. F.;

Two cut meat boxes in kitchen 5 ft. by 2 ft. 6 in. by 6 ft. at 36 deg F.;

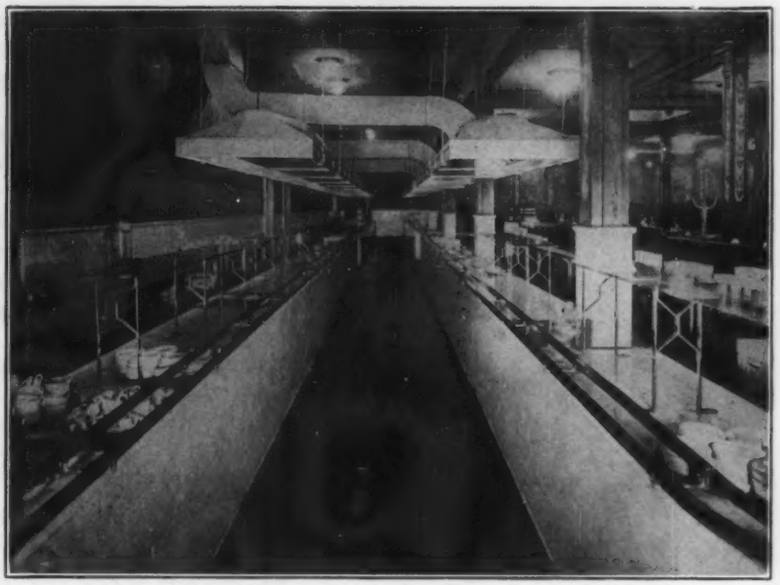
Two fruit and pastry boxes in kitchen 5 ft. by 2 ft. 6 in. by 6 ft. at 38 deg. F.;

Three-room cold storage apartment in basement 16 ft. by 30 ft. by 7 ft. 6 in.; one room for eggs, smoked meats, etc., at 60 deg. F.; another for uncut meat at 40 deg. F.; and the third room for poultry, etc., at 40 deg. F.;

Perfect Illumination of the Interior.

One reserve ice cream cabinet in basement with capacity for forty five-gallon cans in calcium chloride solution, maintained at 20 deg. F. by direct expansion;

One filtered water cooler in basement 4 ft. by 4 ft. by 4 ft., with capacity for 500 gals. per day at 40 deg. F. Water circulated through this is piped to two six spout stands one at each side of dining room.

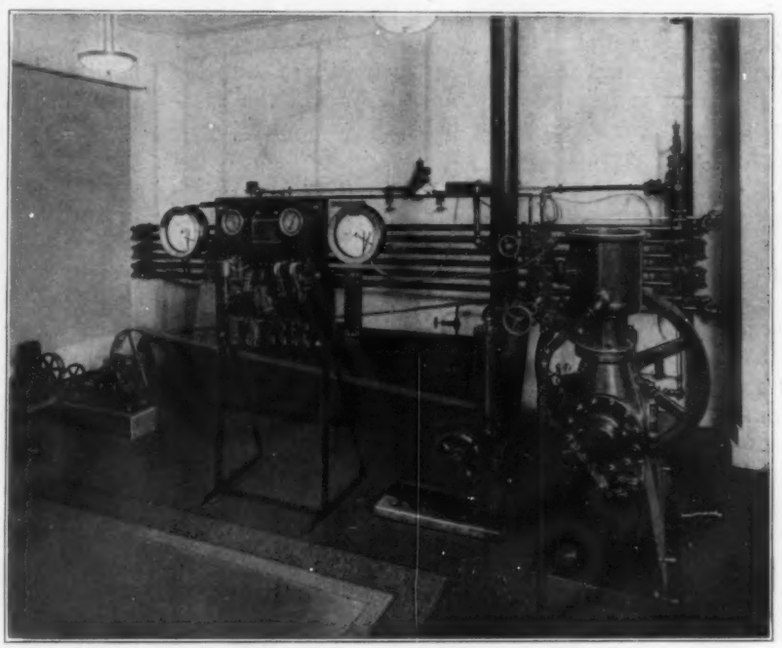


Extensive Serving Counters showing Electrically Operated Suction Ventilators.

To accomplish this refrigeration with ice would be a feat utterly impossible. With ice the low temperatures attained are not practical; constant unvarying temperature cannot be automatically maintained; the atmosphere of the boxes would be humid, clammy and unsanitary; the additional space required for ice and a drainage system for its meltings would be an unnecessary incumbrance; the placing of tons of ice daily in these twenty-three boxes would be an out-of-date procedure, to say nothing of a prohibitive expense compared with the ideal method here employed.

This independent, electrically driven refrigeration plant was designed, manufactured and installed by The Automatic Refrigeration Company of Hartford, Connecticut, to suit the individual wants and conditions of the B. and M. Cafeteria. The outfit consists of a 7½ h.p. Type K.T. General Electric motor belted to an Automatic Refrigeration Company's compressor of 9000 pounds daily refrigeration capacity. No brine circulation is employed, the system being handled by the direct expanson of liquid ammonia through refrigerating lines always partially flooded with the refrigerant under a low pressure and temperature. The work of refrigeration is nearly equally divided between two low pressure distributing lines, on which lines the chambers being cooled are connected in series with each other. Each chamber or box refrigerated is cut into the low pressure line by a by-pass valve, and by the adjustment of the by-pass valve the temperature of each cabinet or chamber is set and maintained constantly at any desired degree. The two low pressure lines or circuits are about 1500 ft. each in length and of pipe ranging from ¾ in. to 1¼ in., the exposed portions of the line being carefully insulated with specially thick cork covering. These circuits operate at approximately thirty-five pounds pressure, which pressure is maintained by automatic expansion valves from a ½ in. high pressure liquid supply line from the ammonia receiver; the pressure of the condenser is also maintained automatically at about 175 pounds. The two low pressure circuits diverging from the ammonia receiver, in shunt with each other, converge into a common suction return at the compressor intake. As all the refrigerated boxes are in series and cooled by direct expansion, all stations are sympathetic to a rise in temperature at any one station on the line; hence a fixed ratio of temperatures always exists between the stations. A sensitive thermostat located in one of the cabinets near the suction end of the line acts as a master temperature control for the whole system, actuating through a relay switch, the motor control stopping and starting the plant on a fall or rise in the temperature of a few degrees, maintaining practically a uniform temperature in each refrigerated chamber.

The whole performance of the plant and system is completely automatic, needing no manual attention except occasional inspection, oiling and wiping. No switches or valves are required to be opened or closed by hand; the plant starts to work and stops automatically, operating not a moment unnecessarily; its behavior is perfect on duty or in face of an interruption of electric power or water supply; the master thermostat automatically controls its hours of operation; an automatic pressure regulator gives an exact expansion to the refrigerant; the flow of the condensing water is controlled by an automatic water regulator which shuts off the water when the condensing pressure



Complete Electrically Operated Automatic Refrigeration Plant.

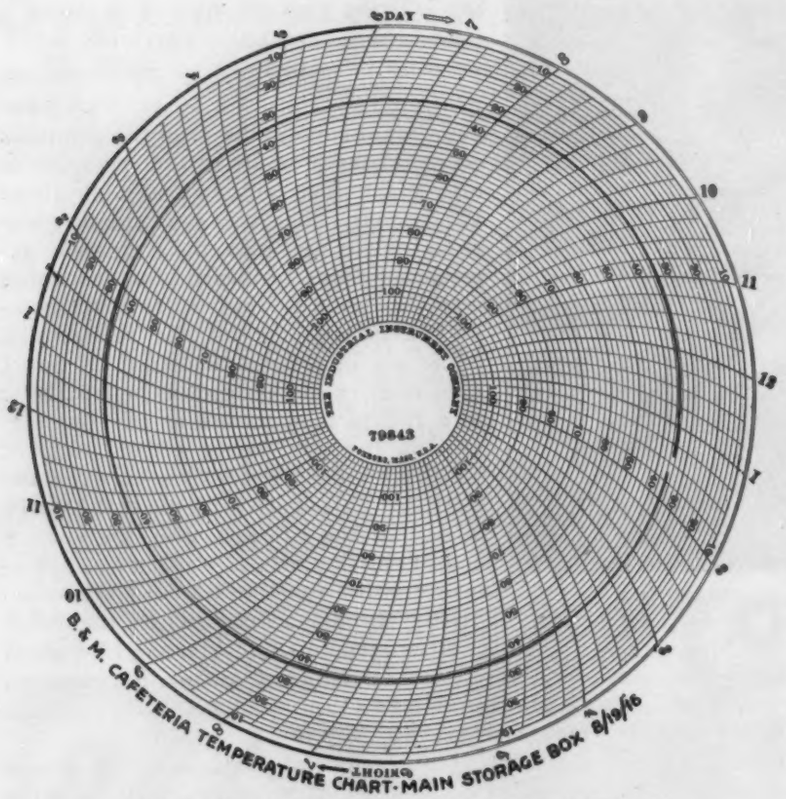


Chart Showing Temperature Variation in 24 Hours.

reaches a predetermined point shortly after the plant stops and turns on the water again when the pressure rises; in case of failure of the water supply to the condenser and consequent rise in pressure at ammonia condenser, an automatic high pressure safety regulator actuates an electrical cut-off shutting down the motor and when the water supply is renewed and ammonia pressure of condenser reduced to normal, this safety regulator cuts in and starts the motor.

The motor is a General Electric Company's standard squirrel cage type, three-phase, 220 volt, 1200 r.p.m. with friction clutch, pulley belted to the compressor through a counter shaft. The average consumption of the plant is 5.25 kilowatts per hour and the average time of operation, being the total of several operations daily, is 15.2 hours per day or 80 kw.-hr. per day. At least two and one-half tons of ice daily would be needed to furnish the equivalent refrigeration of this plant at present, and with ice at $3 per ton the cost would be $225 per month.

An offer was made by a local ice and refrigeration company, having an ammonia refrigeration system of distribution by pipes in the street, to supply the cafeteria with its service for a flat price of $150 per month. The monthly cost to operate this plant by electricity, however, is about $45 for current from the Southern California Edison Company. The other additional slight expenses when added would still keep the monthly operating cost below $50. The further saving of electrical refrigeration as demonstrated by this plant, in time, labor, etc., more than offsets the fixed costs such as interest, depreciation, etc., on its investment. City water is used for condensing purposes, but as this is reused in the kitchen and boiler room, its first use for the cooling of the condenser, therefore costs nothing; in fact, the heat imparted to this water is a distinct advantage and a saving rather than an expense.

Ten other motors for various power purposes are in use in this cafeteria, making a total monthly consumption of about 4800 kw.-hr., which according to the Los Angeles schedule of power rates earns an average rate of about 1.9c per kilowatt hour.

The electric range is not a seasonal proposition. Its autumn and winter sales will nearly reach its spring and summer sales if sound merchandising effort and cogent, consistent advertising is continued all year.

A large number of central stations, dealers and jobbers did not try to sell electric ranges from last October to April because the "electric range does not radiate heat and therefore everyone wants to cook on their coal or wood stove all winter." They were thinking only of the small town house with inadequate heating facilities.

On the other hand, other companies went ahead and sold ranges. But the majority of us talked the summer feature so often and so hard that we sold ourselves the idea. This is entirely wrong! Remember that gas ranges sell as well in the winter as they do in the summer.

Perhaps the electric range does not sell as easily in the small town during the winter as it does in the city where nearly every home has a modern heating system. But the fact remains that it does sell and that the sales depend entirely on the men and methods behind the campaign.

The right type of men produced electric light, the wireless and alternating current. And the right kind of a sales organization directed by a man with both head and go-ahead can sell carloads of ranges during this autumn and winter.

Keep up your range campaign! Keep taking advantage of this present period of prosperity! These are the best days of the whole year! Everyone is full of enthusiasm! Business is unusually brisk! Money is easy—in fact one-third of the country's annual wealth is put into circulation during harvest time!

Feature the electric range in your America's Electrical Week activities! Feature it in your Christmas campaigns! Establish a slogan "Give her an electric range for Christmas"—or one like it! Do anything but think that it has to be 103 deg. in the shade to modernize the cooking methods of your town or city! "Daisy Dayload."

Galalith is an insulating material made in Germany by treating casein with formaldehyde, the casein being obtained by the action of caustic alkali on skimmed milk. It is a bone-like substance resembling celluloid, but free from odor and not so inflammable. Its specific weight is 1.317 to 1.35 and hardness 2.5 (Mohs). It is never entirely transparent.

UP-TO-THE-MINUTE SELLING METHODS.

BY S. C. BRATTON AND G. D. MANTLE.

(This excellent paper received the gold medal at the recent convention of the Pacific Coast Gas Association at Santa Barbara, California. The authors are with the Portland Gas & Coke Company, Portland, Oregon.)

There is one easily applied test of the efficiency of your organization—ask the man in the street what he thinks of your company. Success depends entirely upon the good relations existing between corporation and consumer.

The most remarkable development in the history of the gas industry during the past decade has been, not in manufacturing methods but in the attitude of the individual companies towards their consumer. Ten years ago the adoption of "At your service" as a motto by the average gas company would have been little more than a poorly appreciated jest; today nearly every undertaking on the continent of North America has such a motto and endeavors to live up to it.

This development in the policy of all public service companies is almost paradoxical, for as their organizations have become more and more systematized their attitude towards the public has become more and more human with the consequence that the old opinion that any public utility company was little more than a legalized hold up gang is giving way and it is generally becoming recognized that it is our honest endeavor to give a full dollar's worth of service for every hundred cents expended with us by the consumer.

This improved condition can be traced to the time when the company officials began to realize that the consumer was not only "Meter No. so and so" but a human being whose good or bad will materially affected the figures on the annual balance sheet and who had therefore a very direct interest in the company's policy. This realization led to a closer analysis of local conditions and had two notable results: Better and fuller publicity; and the now almost universal practice of vesting the control of all public relations in one man who acts almost independently of the operating departments and whose duty it is to study all sides of the company's policy from the consumer's point of view.

In this paper it will be the endeavor of the authors to suggest means whereby a careful dissection of the impression gained from the consumers' standpoint can be utilized to develop a highly efficient sales organization. We are afraid therefore that those who from the title of the paper were led to expect details of a series of whirlwind campaigns and sensational advertising stunts will be disappointed. These have their place but they are not "Up to the minute selling methods."

The sales manager of today must take a broader view of his position than his predecessor of even ten years ago, he must realize that it is necessary to devote as careful attention to his field of labor as any husbandman to his, and it is now his object not only to reap in annually a goodly harvest of orders for gas consuming appliances but to clear and fertilize the ground from which the crop must spring.

Clearing the Soil.—His first object therefore should be to thoroughly analyze local conditions and endeavor to remove all sources of irritation. Each consumer's attitude towards the company is determined solely by its policy as it affects him individually and the popular feeling can only be ascertained by conversing freely and frankly with consumers of all classes. Many sources of dissatisfaction can be traced by carefully watching the complaint file. Unfortunately it is too frequently our custom to allow complaints to go to the complaint department for attention without attempting to analyze and use them as a means of detecting conditions which should be remedied. Every complaint means at least a momentarily dissatisfied consumer and a dissatisfied consumer is at the best a poor revenue producer.

Systems of classifications of complaints will readily suggest themselves. A convenient method takes the form of a monthly report compiled from a card index posted daily by the complaint clerk. Cards are printed covering generally every source of complaint and these are filed under convenient headings. As each complaint comes in it is numbered and this number is placed on the card covering that particular complaint under the date received. The monthly report shows the number of complaints under each heading during the month and an unusual number leads to a careful investigation.

This system is not only a check on the company's own service but it is also one on dealers who do not exercise sufficient care in recommending and installing appliances.

Conversation with consumers may reveal another source of irritation which is impossible to remove without the closest personal supervision and the most careful selection of employes; we refer to the attitude adopted towards the public in departments other than the new business. This attitude is rarely if ever intentional but it shows a lack of knowledge of the most elementary principles that should govern the dealings of any servant of a public utility corporation with a consumer or prospective consumer. It must be borne in mind at every moment and under all circumstances that the individual consumer is per se the public at large and is entitled to the same consideration and respect as an authorized body representing all consumers.

The most agrant offenders in this respect are the employes of the collection and credit departments. We do not necessarily advocate any weakening of the credit or collection policy but we do urge that too close an investigation cannot be made before cutting off a consumer or turning down credit and that too much diplomacy cannot be exercised when such a course is necessary. An untactful remark or harsh letter may kill in a minute the good will built up by years of good service.

It is astonishing how many means of improving the service are suggested by analyses such as these, some will cost nothing and some may require a small expenditure which will be returned a hundredfold.

Fertilizing the Soil.—Having cleared the field of all sources of irritation the next step is to prepare and fertilize the ground. To do this it will be necessary to take the public more into the company's confidence than has generally been the case hitherto and

to make the man in the street feel that the gas company is not a body only to be dealt with because the same commodity cannot be purchased elsewhere but an institution with the public welfare, and his welfare in particular, always at heart.

A realization of this point by company officials and a systematic endeavor to gain the real friendship of every section of the community will not only redouble the returns of the new business department for the same expenditure of effort but will obtain the sympathy rather than the antagonism of the public for any contemplated change of rates or policy.

This preparation or fertilization can be accomplished in many ways the most effective being aptly termed "Goodwill advertising"; two fine examples of which will be fresh in the minds of all members.

The first to which we refer is the national magazine publicity of the American Telegraph & Telephone Company. It is not to be imagined that the expense of these advertisements was justified by the number of new conections influenced by them but there is scarcely a person in the United States who does not feel a kindlier interest in the company since reading them and who does not seriously doubt that any federally controlled organization could equal, much less surpass, the present system.

The second example which has a slightly different purpose is the series of advertisements of the People's Gas Light & Coke Company in the Chicago dailies. Everyone who reads them is bound to believe that the proposed change from a candle power to heat unit basis is in the interest of the consumer. A belief which we can scarcely conceive an unitiated public would otherwise entertain.

These two examples are merely mentioned as showing the good results that can be obtained from skillfully handled publicity of this character and there is not the slightest doubt that a regular space in the local dailies with good attractive copy describing the work the company is doing in the interest of the public is an excellent investment. This space should always occupy the same position in the paper and a distinctive lay-out used. The minimum effective space is 18 to 20 inches and the advertisements should appear not less than twice a month. Get the best man in your city to write the copy, the additional expense is negligible when compared with the results and use different copy not only in every issue but in every paper.

Newspaper publicity though most effective is not the only way to prepare the ground. The human mind is a super-sensitive adding machine which automatically credits or debits to the goodwill account of every person or object momentary impressions, pleasant or unpleasant, made by that person or object. The senses chiefly affected are those of hearing and sight and when each employe of a company seizes every available opportunity to speak a courteous word and do a kindly action and the apearance of its offices and men are such that it is a pleasure to approach them, that company is due for a season of unprecedented prosperity.

Sowing the Seed.—The cleared and fertilized field should now be in ideal condition for the reception of the seed, in other words the implanting of a desire to use gas in the minds of the people and as "the creation of a desire to buy" is almost an ideal definition of advertising our next step is clear.

Bearing in mind this definition of the word "advertising" it will be realized that the true advertisement is more than a mere announcement of a certain article at a certain price, which will as a rule only appeal to those who already have in some measure the desire to purchase and will leave untouched the far greater public in whom as yet this wish has not been created. The ideal advertisement appeals to every reader and endeavors to create a feeling that the comfort of the reader is not complete without the article advertised.

Though advertising is not as yet, indeed never can be, an exact science it is nevertheless a science and is in fact applied psychology, supported by a mass of statistics as complete as those used by a large insurance company in determining their risk; and just as the insurance company cannot say exactly what revenue the premiums of a certain number of policy holders will produce but know that in the aggregate they will produce a profit greater than the risk covered so the modern advertiser knows that though he cannot exactly foretell the result of a properly conducted advertising campaign, it will produce a revenue which will more than justifiy the expense involved.

With few exceptions the gas companies have failed to realize the value of press advertising, an omission which is doubly strange when one takes into consideration the fact that they are in a better position to profit by the sale of appliances advertised than the ordinary dealer, as the revenue from the gas consumed is more or less continuous and is not confined to one profit on the sale of the appliance itself.

A large proportion of the population of every town has but the haziest ideas concerning the cost of operation and advantages of even the commonest gas burning appliances yet cannot be reached by direct solicitation. The man and woman of today have, however, been educated to read the advertising columns of the daily papers and to realize that every reputable firm stands behind their anouncements in the press. It would seem obvious therefore that a series of attractive advertisements discussing frankly the advantages and comparative cost of gas consuming appliances must create an interest which it would be impossible to stimulate in any other way.

The full benefit of press advertising can only be obtained by continuous effort, spasmodic announcement at infrequent intervals produce little or no results. Good copy writers are scarce and a good man is worth good money. The company therefore who delegates its advertising to the spare time of one of the clerks need not be surprised if the resultant inquiries are few.

The object of this paper is to stimulate interest in improved selling methods rather than to recommend any detailed policy and it is therefore not our purpose to consider the teachings of advertising. Those members however who desire to go further into the matter, will find much fascinating reading and more food for thought in Dr. Dill Scott's "Theory of Advertising" and Paul Terry Cherington's "Advertising as a Business Force.'

Reaping the Harvest.—A properly conducted advertising department will treble the efficiency of the soliciting staff. The attitude of the public will change. Instead of regarding the solicitor as a more or less unwelcome intruder, the interest created by the advertisements will suggest questions which they will be glad to have answered and the salesman is relieved of the most difficult part of his duties, that of creating interest. There is not a man whose efficiency is not impaired for the rest of the day by a rebuff at a street door and he can now devote his time to real selling; reaping where the advertisements have sown.

Increased efficiency of the advertising department does not mean that less attention need be paid to the soliciting force, rather the contrary, for conditions are changing daily. The age of generalities in salesmanship is passed and prospective customers have now to be shown exactly how they will benefit by every dollar expended.

In the old days a man who had any experience in house to house canvassing of any description was eligible to fill a vacancy on the soliciting staff and was sent out with no more preparation than a few days on the salesroom floor and the information he could glean from a handbook consisting of sheets issued by a score of manufacturers. The results he achieved were due more to the fact that the appliances he sold were a necessity than to any expert salesmanship on his part.

Today our cities are more nearly approaching saturation point and the newer appliances have stronger competition to face than did the gas range. The consequence is that the gas salesman of today must compare favorably in training and address with those in any line of business, and though the subject is worn threadbare it may be worth while to consider for a moment the characteristics of the good solicitor.

Appearance.—His dress must be immaculate from crown to toe. The worst tempered woman will hesitate to shut the door in the face of a neatly dressed competent looking man while the very house dog shows his contempt for unshaven chins, soiled linen and baggy trousers.

Address.—Every woman is queen of the kingdom bounded by the four walls of her home and every man a king—when the queen is out. They therefore expect the greatest courtesy whatever their own attitude.

Stories of poor service must be listened to patiently and misunderstanding explained. Legitimate complaints should be at once reported to the office. More ill feeling is caused by the negligence of employes to report grievances after being requested to do so than by the actual source of complaint.

Control of temper should be a self-evident necessity in every salesman, yet frequently one salesman will remark to another that he had to tell so and so "where to head in" but we have never noticed so and so's order on the salesman's report sheet.

Belief.—The salesman who does not believe in, and would not himself use, the appliances he sells, had better change his line of business, he may have the finest arguments in the world but unless his heart is behind his tongue the punch is lacking and a man with fewer wits but full belief will secure double the business.

Upon the sales manager lies the responsibility of seeing that his men are convinced of the advantage to the consumer of the appliances they sell. No good object can be attained by selling appliances to perform work for which they are inefficiently adapted and a salesman cannot know too much about the cost of operation and the results to be obtained under every condition.

Every solicitor should have at his finger tips the addresses in his district at which each class of appliance is operating satisfactorily and the average monthly bill. He should also be posted on cases of unsatisfactory operation and the reason for the consumer's dissatisfaction.

This information is one of the best weapons in the solicitor's armory. Mrs. Jones who is a prospect for an automatic water heater will be far more impressed if she is informed that Mrs. Smith, two blocks away, has been using a heater for twelve months, would not now be without one and that her average gas bill is $4 per month, than if some purely hypothetical case were stated. If there has been an unsatisfactory water heater anywhere within a radius of a mile Mrs. Jones is certain to have heard of it but if the solicitor is aware of the facts he can explain to Mrs. Jones that the unsatisfactory operation of the heater was due say to the fact that the owner of the heater left the care of the house entirely to her maids and that hot water was running most of the day.

Knowledge.—The new salesman cannot too thoroughly understand that it is his object neither to sell an appliance as an appliance, nor gas as gas; but the work that the heat energy contained in the gas will do. He must understand therefore the nature of the work to be done and how the heat energy can be most efficeintly utilized to do this work. A "British Thermal Unit" must be more than a technical term to him and become the very thing he sells, costing a certain sum and capable of a certain definite amount of work. He should know what specific heat is, what latent heat is, and the meaning of the simpler electrical terms.

He may be only a domestic solicitor but he should know the candle power, gas consumption and rates of commercial arcs should be acquainted with the more general industrial applications of gas and should have the company's credit and collection policy and tariff at at his finger tips.

The specializing solicitor requires even more careful training. The industrial man must know the properties of steam, the composition of the commoner alloys and a thousand and one other things. The lighting man must be able to calculate illuminating values and know the effect of glassware and the effect of various colored lights upon the eyes.

In addition to the regular solicitors every employe who comes in contact with the public is a salesman in potential and should receive a training which will enable him to talk intelligently of the various applications of gas and give rough comparative figures.

How can all this training be given without making serious inroads on the time of both manager and men? In the authors' case a system of bulletins has been the best answer to this question. These bulletins cover the company's credit policy, instructions on writing up orders, a short non-technical article on heat and one on every appliance handled by the company.

Each solicitor is provided with a binder in which to keep his bulletins which are conveniently numbered and replaced as they become obsolete. No excuse is accepted for lack of knowledge of any information contained in a bulletin and the consequence is that every man is instantly alive to a change of policy or prices and is at once conversant with the comparative advantages and costs of every new appliance introduced.

At the time each bulletin is issued to a solicitor an abbreviated form written in a non-technical manner is sent to every employe whose work brings him into contact with the public and is filed by him in his binder. The sales manager, or one of the specializing solicitors also attends the monthly meeting of the other departments and answers any questions arising from bulletins issued during the month. Credit is given to each employe who turns in a prospect form leading to an order and much friendly rivalry results.

Enthusaism.—The greatest factor in building up a successful sales force still remains to be considered —enthusiasm. Without this, personality and training go for naught. If the men feel that the sales manager is a friend deeply interested in their success and welfare not only during but after office hours, if they can feel that he is there to guide and not to chide and if no trouble is too great to make a doubtful point clear enthusiasm is bound to result.

Conclusion.—As already stated our object has been to create thought rather than to recommend any definite sales policy and we believe that the sales manager whose efforts are based on the principles which we have endeavored to outline will benefit far more than if it had been in our power to suggest means whereby a record number of appliances could have been sold in a series of isolated campaigns.

Sales work is not confined to the sales department, every man in the company from president to office boy has but one object—to sell gas. If every effort is organized and all work to the same end success is easy, failure difficult.

We cannot point our moral better than by concluding with an old parable which probably few of us have heard for many, many years:

"Behold, a sower went forth to sow; and when he sowed, some seeds fell by the wayside, and the fowls came and devoured them up; Some fell upon stony places, where they had not much earth; and forthwith they sprang up, because they had no deepness of earth; And when the sun was up they were scorched; and because they had no root, they withered away; And some fell among thorns, and the thorns sprung up and choked them; But others fell into good ground and brought forth fruit, some an hundredfold, some sixtyfold, some thirtyfold."

"Who hath ears to hear, let him hear."

EFFICIENCY METHODS OF ANCIENT ROME.

The modern student in efficiency methods may well draw lessons from the ancients. Read the following from the writings of Cato, of ancient Rome:

When you have arrived at your country house and have saluted your household, you should make the rounds of the farm the same day. * * * When you have observed how the field work has progressed, what things have been done, and what remains undone, you should summon your overseer the next day and should call for a report of what has been done in good season, and why it has not been possible to complete the rest. * * * The overseer will report that he himself has worked diligently, but that some slaves have been sick and others truant, the weather has been bad, and that it has been necessary to work the public roads. When he has given these and many other excuses, you should recall to his attention the program of work which you laid out for him on your last visit and compare it with the results attained. If the weather has been bad, count how many stormy days there have been, and rehearse what work could have been done despite the rain, such as washing and pitching the wine vats, cleaning out the barns, sorting the grain, hauling out and composting the manure, cleaning seed, mending the old gear and making new. On feast days the old ditches should be mended, the public roads worked, briars cut down, the garden dug, the meadow cleaned, the hedges trimmed and the clippings collected and burned, and the fish pond cleaned out. On such days, furthermore, the slaves' rations should be cut down as compared with what is allowed when they are working in the fields in fine weather.

CENSUS STATISTICS FOR ELECTRICAL MACHINERY.

A preliminary statement on the manufacture of electrical machinery, apparatus and supplies has just been issued by the U. S. Bureau of Census. This statement presents a comparative showing of conditions for 1914 as compared with 1909, and is as follows:

	Census 1914	Census 1909	Per cent of increase (1) 1909-1914
Number of establishments (2)	1,030	1,009	2.1
Persons engaged in manufacture	144,712	105,600	37.0
Proprietors and firm members	368	439	—16.2
Salaried employees	26,266	17,905	46.7
Wage earners (av. number)	118,078	87,256	35.3
Primary horsepower	227,731	158,768	43.4
Capital	$355,725,000	$267,844,000	32.8
Services	109,097,000	69,574,000	56.8
Salaries	35,291,000	20,193,000	74.8
Wages	73,806,000	49,381,000	49.5
Materials	154,728,000	108,566,000	42.5
Value of products	335,170,000	221,309,000	51.4
Value added by manufacture (value of products less cost of materials)	180,442,000	112,743,000	60.0

(1) A minus sign (—) denotes a decrease.

(2) In addition, in 1914, 91 establishments, primarily engaged in other lines of manufacture, produced electrical machinery, apparatus, and supplies to the value of $24,261,961, and in 1909, 142 establishments of this character manufactured $18,728,916 worth of electrical machinery, apparatus, and supplies as a subsidiary product.

SPARKS—CURRENT FACTS, FIGURES AND FANCY

Inducing the consumers of public utility service to become financial partners in the enterprise is a movement which has made considerable progress during the past year.

* * *

The shortage of copper in Germany has caused the use of zinc and steel conductors to have a wide application for the conveyance of electrical energy in that country.

* * *

Capital has been subscribed at Phoenix and at Tucson to manufacture rubber of the sap of guayule and ocatilla, desert plants peculiar to southern Arizona. The same plants are found in Texas and northern Mexico.

* * *

There are now being built in the Pacific Northwest thirty-seven ships with a tonnage capacity of 292,000, of which number eleven are wooden vessels of the class of semi-Diesel auxiliary power propellers, with a tonnage of 77,000.

* * *

"Once a week call the bunch together and talk over the things that are not wrong." This was the philosophy of James J. Hill. It ought to be just as applicable to affairs electrical as it proved effective in empire building.

* * *

The War Department is offering an opportunity to members of the various engineering societies to obtain commissions in the engineer corps. Commissions will be issued for the grades of major, captain, first and second lieutenants.

* * *

The price of gasoline in the British Isles has risen to the unheard of figure of seventy-three cents per gallon. This accounts for the fact that California producers are now shipping gasoline via the Panama Canal at considerable profit.

* * *

The largest boilers ever installed in America have just been put into operation by the Ford Motor Company. Each boiler has a heating surface of twenty-five thousand square feet and covers a floor area of nearly four hundred square feet.

* * *

With its more than a quarter of a million miles of railroads the United States not only leads every other nation in the world, but exceeds by 50,000 miles the total railway mileage of Europe. In fact it has two-thirds as much as all the rest of the world combined.

* * *

The classic horse-drawn street sprinkler with rear end spout is now to be replaced by electrically propelled vehicles with the sprinkler heads in front, this arrangement giving the driver better control and understanding of the requirements of the moment than when the sprinkling apparatus is out of sight.

Establshing the harbor line of Lake Washington in Seattle by means of photographs taken from a biplane is the latest advance in commercial possibilities of aeronautics which is being accomplished by engineers in the Northwest.

* * *

The possibility of photographing objects at a distance of several miles by means of a moving picture camera has been investigated by the United States Bureau of Standards. For this purpose a camera of great focal length was constructed. It was found possible to take pictures of objects at a great distance.

* * *

Electric purification of water in swimming pools is becoming popular. The water entering the pool is passed through a battery of filters and then conveyed to the top of a beautiful cascade, where an ultra-violet ray sterilizer is located which exterminates any germ life while the water is passing through the ultra-violet rays.

* * *

The term photo-electricity is applied to the phenomenon which is observed when a beam of light is permitted to fall upon certain substances which are negatively charged with electricity. If the conditions are properly chosen, it is found that such substance, regardless of ordinary leakage, will gradually lose its electric charge.

* * *

Wild burros, descendants of stock left behind when Coronado, the Spanish explorer, crossed the Southwest from Mexico, in 1545, have increased in such numbers, in the Grand Canyon of Arizona, in recent years, that they have become a nuisance. Even if the jitney should become extinct Arizona ought never to lack transportation facilities.

* * *

The Roosevelt dam, head of the Salt River Valley Reclamation Project, abounds with game fish. Bass, planted there by the United State Government since the reservoir began to fill with water, have multiplied many thousandfold, and there are crappie, salmon, perch, and trout beside. In the shallows, soft-shell turtle and carp abound. Land-locked salmon in this lake, very like the Scotch variety, often are caught three feet long.

* * *

The growing scarcity of materials for the manufacture of paper has led the Bureau of Science of the Philippine Islands to make public some important data concerning the supply of such materials in the islands. For several years the bureau has been investigating the suitability of bamboo, cogon grass, abaca, and various palm fibers for paper pulp. The facts collected are regarded as evidence that an industry of great economic value could be developed. It would seem that certain Pacific Coast States could well undertake similar investigations.

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NOTICE TO ADVERTISERS.

Change of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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Electricity—the Champion of Temperature Control

Many convincing arguments may be forcefully advanced in favor of cooking and baking by electrical means. The cleanliness, economy, and food saving resulting from such methods are strong points in the mental picture to be painted before the vision of the prospective purchaser. But the argument that sweeps everything before it, when properly and carefully set forth, is the perfect ease of temperature regulation that is possible to the electrical method and not possible to such a degree of perfection in any other known means of heat application.

This all-sweeping point in favor of the electrical method can not be too strongly emphasized. Not only is it true in ordinary cooking, but in the delicate variation in temperatures needed in baking, electrical control becomes especially advantageous.

Passing from domestic devices wherein heat applications are necessary to those where heat abstraction is desired, recent advances in electrical refrigeration again place the method electrical far superior to all other known systems.

The description to be found on another page of this issue setting forth the details of a recently installed refrigeration plant, in the largest cafeteria in existence, which is located in Los Angeles, is especially interesting at this period of intense campaigning for "Do it electrically."

To properly preserve different foods in color and flavor a delicate regulation of temperature is absolutely necessary. Not only is this true, but different temperatures are required for different foods. Thus it is found that fish is best preserved at 33 degrees F., berries at 38 degees F., and meat at 40 degrees F.

For such a delicate feat as this, ice proves thoroughly unsatisfactory. It can not maintain the temperature required, and the ice boxes prove humid, clammy and unsanitary, to say nothing of the increased cost necessitated.

And finally the delicate control of temperature both at individual refrigerator boxes and at the master regulator makes the electrical method ideal in operation.

This delicate control to be effected by electrical applications has long been recognized in the industries —especially in furnaces where the electrical method has become so popular. In the melting of ores, in the manufacture of gas and countless other applications this strong point is also acknowledged as having been of prime importance in leading the management to adopt the electrical method.

The domestic world has scarcely as yet been fully and forcefully advised of this convincing argument for household uses of electrical eenrgy. The traditions of a thousand years have so implanted conservatism in the household breast, so far as breaking away from time honored methods of cooking by fire as did our ancient ancestors is concerned, that the uprooting of this idea has proved exceedingly difficult.

But the beautiful and perfect regulation of temperature control possible in electrical applications of heat when once painted upon the vision of the housekeeper can never be erased. This is a psychologic point winner. It is correct in theory and awaits practical emphasis alone to place the electrical method

of doing things upon a plane from which it will never recede.

A Perplexing Problem Ahead

Much is being said in these days of expansion in commercial ideals as to the possible commanding position American industry and manufacture will from now on assume among the nations of the world. Looking beneath this rather glittering array of possibilities, however, even the casual investigator finds much for serious reflection.

In the district west of the Rocky Mountains, engineers and others engaged in constructive and commercial activities have long been aware of the fact that vast opportunities await them for intercourse with neighboring countries of the Pacific. The releasing or liquidating of heavy securities, formerly held by European investors, has now placed American credit in such shape that financial aid for reasonably sound investments in the countries may be expected.

The development of the natural resources of these countries will of course call for the advancing of credit and from this will follow an exodus of American engineering and constructive talent from our Pacific Coast shore to these various countries.

Some little discussion has in recent months taken place in financial and commercial papers of national repute warning Americans to verse themselves in the language, customs, laws and methods of doing business in various foreign countries before hastily engaging themselves for foreign enterprise.

An engineering problem that will prove extremely perplexing which has not as yet received much discussion is that of the almost complete lack of standards in construction that will be encountered—especially in hydroelectric activity. Few countries have advanced in standardization methods to the heights at present prevalent in America.

Take for instance our Western hydroelectric networks. So standardized and so centralized has this development become, even over connected distances of six hundred miles, that continuity and economy of service are almost ideal. On the other hand compare conditions with those existing in London, the most populous city of the world. In that great city according to a well known authority, there are some seventy-nine power stations, forty-nine systems of generating, ten frequencies, thirty-two generated voltages, twenty-four distributing voltages and seventy methods of charging. Imagine such chaotic standardization existing in America! What would Ashville, N. C., have done in the recent destructive floods if power plants of Alabama, Georgia and Tennessee could not have tied in immediately?

Then there is the confusion in gauges of rails. In the great republic of Argentina where railroads rival in many instances the mileage and constructive beauty of those in the United States, there exist today a dozen different standard gauges. One American state, that of Pennsylvania, went on record against standardization by passing a law some sixty years ago that all railroad companies within its borders must have a different gauge. In those days, people feared that rolling stock might wander out of sight and lose itself. Today American ideals have vastly broadened.

We should all continue to preach this gospel of standardization. We can well begin missionary work at home by putting into practical application the metric system in which other nations have advanced much further than we. At the same time the hundred other standardized international needs which are now so commonly adopted in the United States might well be propagated among our foreign neighbors with whom we will undoubtedly become so well-acquainted in the near future.

Electrify Your Talk

Some two years back a well-known Pacific Coast sales authority forcefully called the attention of the San Francisco Electrical Development League to the fact that too many electrical men wasted their time in trying to take business away from a competitor rather than by looking afield for new business outlets and thus creating new energizing activities not only for themselves in particular but for the electrical fraternity as a whole. This is real constructive salesmanship. Since that epoch making period when co-operative electrical development was in its infancy, the electrical fraternity has advanced by leaps and bounds. Today a nation-wide campaign is being fostered for the promotion of a gigantic co-operative sales effort during the first week of December, the event to be known as America's Electrical Week.

To make this mammoth electrical event realize the fullest possible returns in the West, the people throughout the length and breadth of this section of the country must be individually brought in touch with this great work. It is not enough that a poster campaign setting forth the wonders of the modern electrical Aladdin should be scattered broadcast throughout the homes of America in some six million reproductions. It is not enough that shows and parades should be instituted in hamlet and city to display electrical enthusiasm and accomplishment. It is not even enough that advertisers on all other subjects should during this period interweave electrical features to assist in this campaign. The greatest good is to be accomplished during this week by making the actual transference of speech partake of electricity and its wonders. In short the pass-word of the week should be to neighbor and customer alike, "Electrify your talk."

Make your games and hours of relaxation partake of electrical tinge.

In the operation of the household as far as possible electric lighting, heating, cooking, sewing, washing, ironing and cleaning should be encouraged to the fullest extent. The up-to-date home is electrical. So are the up-to-date offices and stores, farms and factories. Let the conversation dwell on these facts.

It is an old axiom that a hobby ridden too often in conversation becomes tiresome to the listener. This is not true in this instance. With the ever widening uses and beauties of electricity and its applications the theme is infinite in variety. It is impossible of exhaustion or wearying.

Finally, then, let each charge himself with the subtle thoughts that flash forth intelligent descriptions of the wonders of the modern Aladdin—in a word, during America's Electrical Week "Electrify your talk."

PERSONALS

H. A. Cortwright, of the Valley Electric Supply Company of Fresno, was a recent visitor at San Francisco.

W. I. Otis and **L. E. Sperry,** manufacturers' agents of San Francisco, are making a few weeks' business trip to Los Angeles.

J. H. Newland, purchasing agent of the San Joaquin Light & Power Corporation of Fresno, was a recent visitor at San Francisco.

M. E. Hickox, salesman with the Pacific States Electric Company at San Francisco, has returned from a vacation at Santa Barbara.

Paul B. McKee, assistant to the president of the California-Oregon Power Company, has returned from a short trip to Santa Cruz.

J. P. Bell, Pacific Coast manager Standard Underground Cable Company, has returned to San Francisco from a week's trip to Los Angeles.

F. W. Gay, formerly chief engineer of the J. G. White Company at San Francisco, is now the Pacific Coast correspondent for that company.

W. P. Strandborg, advertising agent for the Portland Railway, Light & Power Company, has returned from a trip to Denver and Colorado Springs.

B. J. Klein, Pacific Coast manager of the Bristol Company of Waterbury, Conn, is making a four weeks' business trip throughout the Pacific Northwest.

Dave Mason, district manager of the Midland County Public Service Corporation of San Luis Obispo, spent a few days this week at San Francisco.

George C. Mason, civil engineer and vice-president of the Hurley-Mason Company, has been elected a member of the Portland Civil Service Commission.

F. T. Van Atta, chief electrician of the Northwestern Pacific Railroad Company, left San Francisco for an extended trip throughout the East last week.

W. W. Briggs, general agent Great Western Power Company of San Francisco, will return from a ten days' business trip to Salt Lake City next Monday.

C. M. Clark, chairman of the board of directors of the Portland Railway, Light & Power Company, was at Portland during the past week from Philadelphia.

C. F. Conn, formerly manager of the San Francisco office of the J. G. White Company, has recently returned to the New York offices, where he will be permanently located.

R. F. Behan, assistant to manager of the Westinghouse Electric & Manufacturing Company at San Francisco, has returned from a two weeks' vacation at Siegler Springs, in Lake County.

Jas. F. Fenwick, assistant manager of the Hawaiian Electric Company, Ltd., of Honolulu, who has been visiting San Francisco for the past few weeks, left for the islands on Wednesday of this week.

S. E. Gamble, formerly of the Great Western Power Company of San Francisco; **H. B. Kinney,** formerly with the H. M. Byllesby Company, and **W. H. Early** have recently taken over the Appliance Manufacturing Company of San Francisco, and have established their factory and offices at 561 Howard street.

Carl J. Rhodin, formerly chief civil and hydraulic engineer for the J. G. White Engineering Corporation at San Francisco, is now in private practice with offices in the Alaska Commercial building, San Francisco. He has made valuation of nearly all the large hydroelectric power systems in California, also working on design and construction, and is now retained by the Sierra & San Francisco Power Company.

H. F. Jackson of San Francisco, has been elected president of the Sierra & San Francisco Power Company, **J. K. Moffitt** first vice-president, **P. M. Hoskins** of New York second vice-president, and **F. J. Blanchard** of San Francisco, secretary and treasurer, at the annual meeting last week. The former board of directors was re-elected. Announcement was made that $1,000,000 additional in bonds had been sold and the proceeds would be applied to new construction.

W. M. Shepard, commercial manager of the California-Oregon Power Company, is making a tour of inspection throughout Northern California and Southern Oregon. The Klamath River Dam No. 1 is being rushed to completion before winter sets in. There are now 250 men on the job. There seems to be decided activity shown in the mining district in Southern Oregon, and their 60,000 volt line running between Castella and Carville is now ready and furnishing current to the Yukon Gold Dredging Company.

MEETING NOTICES.

San Francisco Electrical Development & Jovian League.

The annual meeting and election of officers of the league was held at the Palace Hotel, 12:15 p. m., with President E. M. Cutting presiding.

The minutes of the preceding meetings of the year were adopted as a whole, as was also the treasurer's report showing a balance on hand as of October 10, 1916, of $418.78. H. V. Carter, chairman of the finance committee, called particular attention to the matter of prompt payment of dues and suggested active work be done among the members along this line. The report of the nominating committee, appointed at the September 30 meeting, was submitted as follows:

L. H. Newbert.....President.
R. M. Alvord.....1st Vice-President.
R. E. Fisher.....2d Vice-President.
C. E. Wiggin.....Executive Committee.
H. H. Hoxie.....Executive Committee.
J. W. Redpath.....Secretary-Treasurer.

This report was unanimously accepted and the secretary instructed to cast the ballot for nominees. A vote of thanks was tendered the retiring officers and complimented for their work during the past year. The newly-elected President, L. H. Newbert, was conducted to the chair and conducted the concluding part of the meeting.

Los Angeles Jovian Electric League.

The regular weekly luncheon was held October 11th, at Jahnke's Tavern, with the honors to W. L. Frost, assistant to the general agent of the Southern California Edison company, as chairman of the day. A. H. Halloran was speaker of the day and delivered an address on the subject of "A Greater Jovianism." He complimented the League on the excellent work done during the past year and lauded the spirit of co-operation and loyalty that has kept the League well to the front on the coast. As Pacific Coast representative of the Society for Electrical Development he explained the aims and purpose of America's Electrical Week and urged the electrical men of Los Angeles to participate actively. The following officers were elected for the coming year: President, A. E. Morphy, Southern California Edison Company; first vice-president, K. E. Van Kuran, Westinghouse Electric & Manufacturing Company; second vice-president, Carl Young, Illinois Electric Company; secretary and treasurer, Clifton Peters, Southern California Edison Company; board of directors, Thos. Foulkes, W. S. Gibbs, C. M. Bliven, E. R. Northmore, R. H. Manahan, C. B. McLean. The growth of the League during the past year, the active membership of which now numbers 305, is directly due to the efforts of President C. A. Holland and his officers and directors and a fast pace

has been set for the coming year. Retiring president Holland spoke especially of the assistance rendered by H. N. Sessions, chairman of the paper committee, and Carl Young, chairman of the press committee. A hearty vote of thanks was given the retiring officers for their untiring work in the league's behalf.

Portland Sections of A. I. E. E. and N. E. L. A.

The first regular joint meeting of the Portland section of the American Institue of Electrical Engineers and the National Electric Light Association, was held at the Estacada Hotel, Tuesday evening, October 10, 1916. A special train left First and Alder streets at 5:30 p. m. with 123 members and guests. Immediately upon arriving at the hotel a special dinner consisting of chicken and salmon trout was served.

L. T. Merwin acted as chairman. The chairman of the various committees outlined their work for the year; after which a vocal solo was rendered by Henry S. Cougall, accompanied by J. R. Davies.

In order that O. B. Coldwell, "President of the Jitney Drivers' Union," would not fail to get an opportunity to present his carefully prepared address, Mr. Merwin called upon him as the first speaker of the evening. His subject was "Why the Jitney Should Not Be Regulated." His views met with general approval, and the Estacada Band (Henkle's) appeared upon the scene and serenaded Mr. Coldwell.

E. F. Whitney, General Electric Company, made a stirring appeal for the use of "Kerosene instead of Mazda Lamps." As the fall election is drawing near, it was thought advisable to have some speeches on the various issues of the day by prominent and well-informed candidates. A. S. Moody, vice-president and manager Pacific States Electric Company, spoke for prohibition. W. H. Galvani, Pacific Power & Light Company spoke on Socialism. E. R. Lundburg, a prominent Democrat, spoke on "Why Mr. Hughes should be elected." J. H. Lang, counsel for the Pacific Light & Power Company, a Republican, spoke on "Why Woodrow Wilson should be elected."

W. D. Scott, Pacific Telephone & Telegraph Company, was called upon to tell why everyone in Portland should use Home telephones. Also Mr. A. C. MacMicken told the meeting why they should use gas for cooking, and Mr. Geo. G. Bowen, Northwest Electric Company, told "Why a sales manager should not know anything about the business."

The first meeting of the semi-monthly luncheon club of the Joint Sections of the A. I. E. E. and the N. E. L. A. and the Oregon Society of Engineers will be held at noon October 25th in the orange room of the Oregon Hotel, Portland, Oregon. The program of the day will be arranged by the Pacific Power & Light Company.

The second regular joint meeting of the Portland sections will be held at 8 o'clock Tuesday evening, November 14, 1916, at the Electric Building, Portland, Oregon.

U. S. CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission announces an open competitive examination for expert electrical and mechanical aid to fill a vacancy at $12.48 per diem, in the Bureau of Yards and Docks, Navy Department, Washington, D. C. The duties of this position cover the expert maintenance and supervision of the operation of all navy-yard power plants, embracing the economical production, distribution, and utilization of electric power for manufacturing, pumping dry docks, charging submarines, and for ships undergoing repairs; compressed air for manufacturing; steam for power and central heating, and production and distribution of hydraulic power; also investigations of power-plant operating conditions, tests of plants and equipment, and efficiency engineering work in connection with improvement of operating conditions and instruction of plant operatives to obtain economical operating results. The appointee will give expert advice upon, and will be held responsible for, the design of new projects for the economical production of power, in which will be included pumping plants for dry docks, power plants and distribution systems for experimental laboratory, projectile plant, armor plant, equipment for supplying power to radio stations, heating and lighting equipment for various prospective public works, such as hull-construction shops, foundries, machine shops, barracks, storehouses, offices, etc.; also upon the design and layout of extensions to present plants to provide for prospective expansion of yards and stations and the remodeling of lighting systems in existing buildings and shops.

Competitors will not be assembled for examination, but will be rated on technical education (40 points); experience and fitness (60 points). Graduation with a degree of mechanical engineer or electrical engineer from a college or university of recognized standing, and at least ten years' subsequent experience in responsible charge of the design, installation, and operation of central power plants and distribution systems for light, heat and power with executive experience in handling successfully large numbers of power-plant employes, are pre-requisites for consideration for this position. Additional credit will be given candidates who have had special experience in connection with the power and operating requirements for radio work.

PUBLICATIONS RECEIVED.

The Nitration of Toluene, by E. J. Hoffman, has just been issued as Technical Paper 146, by the Bureau of Mines, Department of the Interior.

Technical paper 116 of the U. S. Bureau of Mines deals with subjects concerning safe practice at blast furnaces. It is in the nature of a manual for foremen and men.

A new publication of the Bureau of Standards (Circular No. 60) entitled "Electric Units and Standards," gives comprehensive and up-to-date information regarding the units and standards in terms of which electric and magnetic measurements are made. It includes the history of the units and the evolution of the definitions upon which the laws on electrical standards are based. The laws of this and other countries are given. These laws are in substantial agreement, and the various national bureaus of standards co-operate in maintaining the fundamental standards. The circular gives conversion factors, by means of which measurements may be expressed in any desired unit. The information on electric units and standards had not previously been available in a single publication.

NEW CATALOGUES.

The Sprague Electric Works of the General Electric Company has just issued Bulletin No. 48707 on direct current motors and controllers for job presses, folders and bookbinding machinery.

The Dearborn Chemical Co. of New York send a well illustrated pamphlet of thirty-two pages on incrustation, corrosion, foaming, and other effects of water used in steam making together with methods of prevention.

Hughes Electric Bake Ovens is the subject of an interesting pamphlet from the Hughes Electric Heating Company. Besides giving complete information on the Hughes lines it presents arguments and cost data on electric baking in general.

NEWS OF IDAHO PUBLIC UTILITIES COMMISSION.

The Meadows Light & Power Company has been ordered by November 5, 1916, to report to the commission a plan for the extension or enlargement of its present hydroelectric plant sufficient to furnish electrical energy to meet present and reasonable future demands.

NEWS OF CALIFORNIA WATER COMMISSION.

The Oak Spring Water Company of Victorville has applied for permission to appropriate 3 sec. ft. of the waters of Oak spring in San Bernardino county for agricultural purposes. The plans propose a dam 50 ft. high, 160 ft. on top and 20 ft. on bottom, with clay core, with sand fill front and back, core to be 4 ft. thick to top of dam, also a pipe line 6½ miles long. The estimated cost is $5,000 and the number of acres to be watered, 200.

....The James Mills Orchards Corporation and the Esperanza Land Corporation of New York have applied for permission to appropriate 20 cu. ft. per second of the waters of Stone Corral creek, tributary to Colusa basin in that county, for purposes of agriculture. It is proposed to lift the water by means of pumps for the irrigation of 4,823 acres of land.

Robert Cords Jr. of San Francisco has applied for permission to appropriate for agricultural purposes 20 cu. ft. per second of the waters of Avenal creek in Kings county, the request being for the storm or flood waters of said creek. At a cost of $1,500, and by means of a ditch a mile in length, applicant intends to bring water to 640 acres.

Webb Bros. Company of Yreka have applied for permission to appropriate for agricultural purposes, 12 cu. ft. per second of the waters of Shasta river, tributary to Klamath river in Siskiyou county. The plans propose a canal and pipe line 4 miles long, the water to be diverted to a sump and raised 95 ft. and thence to the lands by pipe and ditches. The number of acres proposed to be watered is 1,200 and the estimated cost is $20,000.

May E. Ivory of Alturas has applied for permission to appropriate for irrigation, 1,550 acre feet per annum of the waters of the Antelope Plains drainage area, tributary to Pit river. The estimated cost is $2,400 and the number of acres to be irrigated, 675.

The city of Arcadia has applied for permission to appropriate for municipal purposes the waters of Big Santa Anita creek and its tributary, Clamshell creek, to the extent of 6 cu. ft. per second. In the proposed works there is a 16-in. pipe line 1,232 ft. long from Big Santa Anita creek, which joins with a 6-in. pipe line 1,395 ft. in length from Clamshell creek, thence a 16-inch pipe line 10,988 ft. long to place of use. The water is diverted by means of two boulder concrete dams, and the estimated cost of the works is $25,000.

William L. Wales of Woodland has applied for the proposed Honey Lake district, to appropriate 200 cu. ft. per second of the waters of Butte creek and a like amount from Horse lake, both diversions being in Lassen county. No data is given in regard to the project, with the exception that it is proposed to irrigate 40,000 acres.

The Mono Canal Company has applied for permission to appropriate 750 cubic feet per second of the waters of Rush and Lee Vining creeks in Mono county, tributary to Mono Lake. No data are given in regard to the engineering phases of the project except to maintain that there is a canal 30 miles long. The application states that it is proposed to irrigate 50,000 acres at an estimated cost of $500,000.

D. M. Eckhard and P. B. McBride of Davis Creek have applied for permission to appropriate 175 acre feet of the waters of Parker Flat Canyon, tributary to Geese Lake in Modoc county. A main ditch 2½ miles long is proposed to carry the water to 110 acres of land at an estimated cost of $2000.

The City of Los Angeles Public Service Commission has applied for permission to appropriate 10 second feet of the waters of Cartage Creek in Inyo county. The proposed diversion relates to one of the units of the power scheme of the city of Los Angeles. The application sets forth that the applicant proposes to divert the water into the Los Angeles aqueduct 232 miles long, by means of a concrete flume and gives the estimated cost of the power and aqueduct plants at $33,000,000.

The Lucerne Water Company of Montague, Siskiyou county, has applied for permission to appropriate 50 cubic feet per second of the waters of Shasta River tributary to Klamath River for irrigating 5000 acres. A dam is proposed to back the water into a sump. A pumping plant at the dam will elevate 70 ft. above the river through a 40 in. pipe. For the main lift there is proposed a 20 in. pump driven by a 300 h.p. motor, and for the secondary lift a 12 in. pump operated by a 200 h.p. motor. The water will be carried thence 720 ft. through a pipe line and a flume 1170 ft. long to the main ditch. The estimated cost of the project is given as $50,000.

Eugene Rutherford of Butte county has applied for permission to appropriate for irrigation purposes, 10 second feet of the waste waters flowing into Stone Slough, tributary to Hamilton slough. The main ditch as proposed, is to be 12,736 ft. long, and the number of acres of land it is proposed to irrigate is 880.

R. Whitehead of Oakland has applied for permission to appropriate 150 cubic feet per second of the waters of Plumas Lake and Feather River, tributary to the Sacramento River, for the purpose of raising rice and other agricultural products. The proposed diversion is in Butte county. A main canal 3 miles long is a part of the works, the only data given in the application on the engineering phases. Complete maps will have to be prepared before the application can be further considered by the commission. The estimated cost of the project is given as $50,000 and the number of acres to be watered as 6309.

Ed. Ivory of Alturas has applied for permission to appropriate 893 acre feet of Ryegrass Swale and tributaries, tributary to Canyon Creek in Modoc county. A main ditch 1250 ft. long is proposed to carry the water to 663 acres at an estimated cost of $2200.

NEWS OF ARIZONA CORPORATION COMMISSION.

The Navajo-Apache Telephone System of Holbrook, Ariz., has been granted permission to change its toll rates in accordance with schedules submitted by the company. In the proposed schedule, all arbitrary rates are abandoned and the system is put upon an air mile basis, with a rate of one cent per air mile for five minutes' conversation; the result being that many of the present rates will be reduced by amounts varying from five to fiften cents, and several will be raised five cents.

On or before November 20, 1916, the Desert Power & Water Company has been ordered to file with the commission a complete and detailed statement showing the value of its property, tangible and intangible, devoted to serving its consumers with electricity. This statement shall contain an inventory of its property with quantities and values set forth in such a way that same may be checked from an examination of the property and records of the company.

BOOK REVIEWS.

Electrical Engineering. By Ernst Julius Berg, Sc. D. Size 5 in. by 9 in.; 332 pp.; 163 illustrations; cloth binding. Published by the McGraw-Hill Book Company, Inc., of New York and for sale at the Technical Book Shop, San Francisco. Price $3.50.

This is an advanced course in electrical engineering. The book is based upon the subject matter contained in a series of lectures given to graduate students in electrical engineering at Union College where the author is professor of electrical engineering. The book largely aims at setting forth the mathematical deduction of equations representing alternating current phenomena, such as the building up of currents in a wire and transient phenomena connected with it, as well as many other problems of higher mathematical analysis. The method of approach is clear and logical. To students of advanced reasoning of this nature, the book will prove of great value.

NEWS NOTES

ILLUMINATION.

WEISER, IDAHO.—Sayer & Record have been awarded the contract for installing the new electric light plant at Arco, Idaho, which was provided for by a recent bond issue.

SANTA BARBARA, CAL.—Metal ornamental light standards have been decided upon for State street by the city council. The plans provide for ten posts to the block.

SUNNYSIDE, WASH.—The Pacific Power & Light Company is to install 14 new 4000-candlepower lights in the business district and 41 100-candlepower lights in the residence district.

LOS ANGELES, CAL.—The city council has ordered an ordinance of intention prepared providing for the ornamental lighting of Washington street, between Main street and Central avenue.

POCATELLO, IDAHO.—Bids will be received by the City Council until October 26th for the construction of an incandescent street lighting system in Local Street Improvement District No. 15.

KLAMATH FALLS, ORE.—The granting of a franchise to the Reno Power Company of Reno, to furnish light and power to this city will be submitted to the people at a special election on November 14th.

FRESNO, CAL.—Fresno county will erect its own lighting system for Court House Park. Several weeks ago the supervisors advertised for bids. The lowest received was $13,987, and all bids were rejected.

SACRAMENTO, CAL.—The board of supervisors has called for bids for furnishing electricity and necessary equipment for lighting approximately thirty-five 400-candlepower series of Mazda lamps, for a period of five years.

BREMERTON, WASH.—The mayor has vetoed the proposed franchise for the gas plant here, which was granted to E. L. Blaine, of the Graff Construction Co., Seattle. This would have called for the expenditure of $150,000.

LOS ANGELES, CAL.—Sealed bids will be received by the board of supervisors up to November 6th for the installation of an electrical system in various buildings to be erected on the grounds of the Los Angeles County Hospital.

CHLORIDE, ARIZ.—J. E. Terral of the Chloride Electric Supply Company, states that he has wired 250 houses in an anticipation of the early arrival of electricity. A line is to be brought here by the Desert Power Company.

CLE ELUM, WASH.—Bids will be received by the town of South Cle Elum until November 6th, for the purchase of $5000 worth of bonds, the money to be used to partially pay for the construction of a municipal electric light plant.

DOUGLAS, ARIZ.—Assessment rolls for the ornamental lighting system to be installed in the G avenue and Tenth street district have been completed by the city engineer. The exact cost of the system for the district will be $12,543.76.

LOS ANGELES, CAL.—The board of public works has let the contract for the installation of lighting posts and appliances on Hollywood boulevard between Cherokee avenue and Wilcox avenue ,to the McEwan Electric Company, on its bid of $2096.

LOS ANGELES, CAL.—Improvements to cost $356,789 are planned by the Southern Counties Gas Company it has been announced. The contemplated work embraces the completion of the Pomona-Brea line and an additional transmission main between Whittier and Monrovia.

LOS ANGELES, CAL.—The lighting problem of Athens-on-the-Hill will be terminated when the board of supervisors make an order to the effect that an ornamental lighting system be installed in the district west of Main street and that the district which opposed this form of street light, namely east of Main, will have arc lights.

TRANSMISSION.

NELSON, B. C.—It is reported that the directors of the Utica mine will install a power plant.

OAKDALE, CAL.—The Sierra & San Francisco Power Company has purchased two lots on F street and will erect a substation.

MOORE, MONT.—The electrical system of this place is to be reconstructed in the spring according to the local representative of the Montana Power Company.

KINGMAN, ARIZ.—Bids are being received at the Oatman office of the Oatman Revenue Mines Company for the erection of a power plant, head frame and camp equipment.

SAN FRANCISCO, CAL.—The City Electric Company has awarded the contract for the erection of a substation building on Bush street near Grant avenue, to G. O. W. Jensen for $37,800.

COEUR d'ALENE, IDAHO.—The Central Heating & Electric Company has been incorporated by F. D. Warn, et al., to utilize the franchise recently granted by this city to Wm. Dollar.

MELSTONE, MONT.—H. A. Amberg has been awarded the contract for constructing the generator room of the municipal electric light plant. Bonds to the amount of $8000 were sold for this purpose.

SUNNYSIDE, WASH.—An ordinance has been passed by the council granting the Pacific Power & Light Company permission to construct and operate power lines supplying electricity to the town of Sunnyside.

FOREST GROVE, ORE.—Application for a franchise by the Portland Gas & Coke Company to lay mains here has been made. It is understood that the company proposes to ask a franchise for laying mains in the county also.

BAKERSFIELD, CAL.—The Southern Sierras Power Company has been awarded a franchise to erect and maintain for 50 years an electric pole, tower and wire system, along the public highways in certain portions of Kern county.

QUINCY, CAL.—The Walker Mining Company of Salt Lake City has applied to the state water commission for permission to appropriate 20 cu. ft. per second of the waters of Ward and Nyo creeks in Plumas county for power purposes, used in mining and milling.

MILTON, ORE.—J. E. Shipp, of North Yakima, chief construction engineer of the Pacific Power & Light Company, has arranged to start work on reconstruction of the flume of the company here. This is a 7-mile open wood affair and will be replaced with concrete. The cost will be about $40,000.

GREENVILLE, CAL.—Surveying parties employed by the Great Western Power Company have been engaged the past season on the north fork of the Feather River, between Butte Valley and Belden. Some big developments in the installation of hydroelectric plants are expected to take place next season.

REDDING, CAL.—The Northern California Power Company has taken an option for five years on the Weaverville Electric Company's plant and will extend lines to Weaverville and possibly to Junction City, where connection will be made with lines of the Western States Power Company, that serves Eureka.

BUTTE, MONT.—Development of a 200,000 h.p. project in the Big Horn canyon in Montana is being considered and the proposal to use it for electrification of one of the units of the Northern Pacific Railway is one of the uses to which the power will probably be put. The estimated cost of the project is $12,000,000.

LOS ANGELES, CAL.—Mayor F. T. Woodman, R. F. Del Valle, president of the public service commission; Martin Betkouski, president of the city council; W. A. Roberts of the council public service committee and John W. Kemp of the public service commission were appointed as a committee by Mayor Woodman, to negotiate with the power companies for the purchase of their distributing systems inside the city.

TACOMA, WASH.—Geo. A. Avery of Roy, has requested of the commissioners a franchise to construct transmission lines over highways near Dupont. A hearing will be had on same at 11 a. m., October 19th. Tentative plans for heating all of the city's department stores and office buildings through a central heating plant backed by local capital and the diversion of about $25,000 worth of new lighting business annually to the city lighting plant, have been made between the city council and W. H. Snell, Edw. Fogg and J. Walsh, a committee representing the new heating concern.

TELEPHONE AND TELEGRAPH.

ONTARIO, CAL.—The Western Union will soon erect a modern office building in this city.

SPOKANE, WASH.—The inclusion of a proposition to bond the city for the purpose of installing a municipal phone plant in the next municipal election now appears practically certain.

STANWOOD, WASH.—Articles have been filed with the county auditor for the Peoples Telephone Company with headquarters here. Capital is $10,000. Peter Henning and others are the incorporators.

CHEHALIS, WASH.—The Salzer Valley Telephone Company has petitioned the Lewis county commissioners for a franchise to construct and operate telephone lines south of Centralia over the county roads.

SALEM, ORE.—The Victor Point and Silverton Cooperative Telephone Company has filed articles. It proposes to build and operate a farmers' telephone line between Victor Point and Silverton. W. F. Krantz and others are the incorporators.

ABERDEEN, WASH.—W. C. Mumaw has received notice of the approval by his company of the proposal to construct the Humptulips telephone line. It has not been decided whether it will be constructed this fall or next year. Construction will start from Hoquiam and cost will be $7500.

LOS ANGELES, CAL.—The Municipal League has appointed a committee to report on the proposed telephone merger. The committee is composed of Lee Chamberlain, R. W. Burnham, H. C. Fryman, C. W. Conant, Tracy C. Becker, F. F. Dodson, M. O. Graves, S. G. Marshutz and Seward C. Simons

EUGENE, ORE.—The Northwestern Telephone Company is seeking an entrance into Eugene for a long distance line. This company maintains a service between Portland, Oregon City, Albany and Corvallis. It proposes to erect a central office with central lines to offices and business houses, having a large amount of long-distance business but will not conduct a local telephone business.

SANTA BARBARA, CAL.—William R. Staats & Company have purchased $100,000 of the issued 5 per cent 30-year bonds of the Santa Barbara Telephone Company, which recently purchased all the properties of the Pacific Telephone and Telegraph Company, the Home Telephone of Santa Barbara and the Home Telephone of Santa Barbara county. The issue is secured by combined properties whose structural value is appraised at $821,521.

TRANSPORTATION.

RICHMOND, CAL.—The extension of the street car line on San Pablo avenue, from Grand Canyon Park up San Pablo Canyon to the new dam of the Peoples Water Company, is the latest traffic plan in Richmond. The new line will be about six miles in length.

STEILACOOM, WASH.—The council has passed an ordinance granting the Pacific Traction Company the right to construct, maintain and operate single or double track railway on Steilacoom boulevard, between the town limits of Steilacoom and Starling street.

IRRIGATION.

BLYTHE, CAL.—It now looks as if the region of Cibola is to have an irrigation system whereby a portion of the land will be watered.

TALENT, ORE.—C. E. Bade has been engaged by the Talent Irrigation District to construct a system to irrigate 5000 acres of land.

EVERETT, WASH.—J. F. Klein and others have filed on 1000 cu. ft. of water per second on the Boulder River in the southern section of the county and plan development of water power.

SEATTLE, WASH.—The King and Pierce County river improvement fund will have $150,000 aside from the $100,000 appropriated by Pierce County. Other river improvements will cost $30,000.

MODESTO, CAL.—Bids for the $465,000 bond issue of the Waterford Irrigation District, voted last month, have been opened by the board of directors, and the sale of the bonds taken under advisement.

MONTAGUE, CAL.—The Lucerne Water Company has applied for permission to appropriate 50 cubic feet per second of the waters of Shasta River, tributary to Klamath River, for irrigating 5000 acres. The estimated cost of the project is given as $50,000.

BOISE, IDAHO.—The Secretary of the Interior authorizes the reclamation service to construct two drains out of the sum of $350,000 set aside for drainage construction in cooperation with the Pioneer Irrigation District, Boise project, provided the engineers consider such work necessary.

TERRA BELLA, CAL.—Sealed bids for the construction of an irrigation works for the Terra Bella Irrigation District will be received by the board of directors up to November 13th. The work comprises the construction of 16 wells and well pumping plants and 40 miles of pipe line of from 30 to 40 inches in diameter.

EXETER, CAL.—Work for the Lindsay-Strathmore Irrigation District has started in earnest, and men are already busy with the installing of miles of redwood pipes needed to carry the water from the Exeter district to where it is needed to supply the orange groves in the Lindsay and Strathmore districts. The Redwood Manufacturing Company of San Francisco has the contract for supplying all of the redwood stave pipe.

VICTORVILLE, CAL.—Wm. M. Hunt, Jr., on behalf of the proposed Mohave Irrigation District, now in process of formation, has applied for permission to appropriate 300 cu. ft. per second of the waters of Deep Creek and West Fork of the Mojave River, tributary to Mojave River in San Bernardino county. The plan proposes a dam for impounding 100,000 acre feet of water and main canals 30 miles long, for the irrigation of 50,000 acres.

INTERIOR CONDUIT TABLE.

In order to have a basis on which to work for arriving at the proper size of conduit to use in connection with the installation of insulated wires, of various sizes and number, the Electrical Department of the City of Portland, Oregon, and the Underwriters' Equitable Rating Bureau have compiled the following table.

Single Conductor Combination.

Note.—Where special permission has been given in accordance with No. 26, p. the following table to apply.

No. of Wires.	Size Conduit, in. Electrical Trade Size.
3 No. 14 R.C. solid	½
5 No. 14 R.C. solid	¾
10 No. 14 R.C. solid	1
18 No. 14 R.C. solid	1¼
24 No. 14 R.C. solid	1½
40 No. 14 R.C. solid	2
74 No. 14 R.C. solid	2½
90 No. 14 R.C. solid	3

Conduit Table.—Giving Sizes of Conduit Which Will be Required for Various Combinations of Wires.

Size.	Area.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	5 in.
½ in.	.196	.392	.638	.981	1.423	1.963	3.337	5.105	7.265	9.817	12.762	19.831
		¾	1	1	1¼	1½	2	2½	3	3½	4	5
¾ in.	.442	.638	.884	1.227	1.669	2.209	3.583	5.351	7.511	10.063	13.008	20.077
		¾	1	1¼	1½	1½	2	2½	3	3½	4	5
1 in.	.785	.981	1.227	1.570	2.012	2.552	3.926	5.694	7.854	10.406	13.351	20.420
		1	1¼	1½	1½	1½	2	2½	3	3½	4	5
1¼ in.	1.227	1.423	1.669	2.012	2.454	2.994	4.368	6.136	8.296	10.848	13.793	20.862
		1¼	1½	1½	2	2	2½	3	3	3½	4	5
1½ in.	1.767	1.963	2.209	2.552	2.994	3.534	4.908	6.676	8.836	11.388	14.333	21.402
		1½	1½	2	2	2	2½	3	3½	4	4	5
2 in.	3.141	3.337	3.583	3.926	4.368	4.908	6.282	8.050	10.210	12.762	15.707	22.776
		2	2	2	2½	2½	3	3	3½	4	4½	5
2½ in.	4.909	5.105	5.351	5.694	6.136	6.676	8.050	9.818	11.978	14.530	17.475	24.544
		2½	2½	2½	2½	3	3	3½	4	4	4½	6
3 in.	7.069	7.265	7.511	7.854	8.296	8.836	10.210	11.978	14.138	16.690	19.635	26.704
		3	3	3	3	3½	3½	4	4	4½	5	6
3½ in.	9.621	9.817	10.063	10.406	10.848	11.388	12.762	14.530	16.690	19.242	22.187	29.256
		3½	3½	3½	3½	4	4	4½	4½	5	5	6
4 in.	12,566	12,762	13,008	13.351	13.793	14.333	15.707	17.475	19.635	22.187	25.132	.....
		4	4	4	4	4½	4½	4½	5	5	6	..
5 in.	19.635	19.831	20.077	20.420	20.862	21.402	22.776	24.544	26.704	29.256	.....	.....
		5	5	5	5	5	5	6	6	6	..	..

Rule 28 (i) of the N. E. C. is as follows:

Size of Conduits for the Installation of Wires and Cables.

	Number of Conductors in System.			
Size B. & S.	One conductor in a conduit. Size conduit, in. Electrical trade size.	Two conductors in a conduit. Size conduit, in. Electrical trade size.	Three conductors in a conduit. Size conduit, in. Electrical trade size	Four conductors in a conduit. Size conduit, in. Electrical trade size.
14	½	½	½	¾
12	½	¾	¾	¾
10	½	¾	¾	1
8	½	1	1	1
6	½	1	1¼	1¼
5	¾	1¼	1¼	1¼
4	¾	1¼	1¼	1½
3	¾	1¼	1¼	1½
2	¾	1¼	1½	1½
1	¾	1½	1½	2
00	1	1½	2	2
00	1	2	2	2½
000	1	2	2	2½
0000	1¼	2	2½	2½
CM.				
200000	1¼	2	2½	2½
250000	1¼	2½	2½	3
300000	1¼	2½	2½	3
400000	1¼	3	3	3½
500000	1½	3	3	3½
600000	1½	3	3½	...
700000	2	3½	3½	...
800000	2	3½	4	...
900000	2	3½	4	...
1000000	2	4	4	...
1250000	2½	4½	4½	...
1500000	2½	4½	5	...
1750000	3	5	5	...
2000000	3	5	6	...
Twin Conductor.				
14	½	¾	1	1
12	½	¾	1	1¼
10	¾	1	1¼	1¼

Three Conductor Convertible System.

——Size of Conductors—— Two Conductor. Size B. & S.	One Conductor. Size B. & S.	Size Conduit, in. Electrical Trade Size.
14	10	¾
12	8	¾
10	6	1
8	4	1
6	2	1¼
5	1	1¼
4	0	1½
3	00	1½
2	000	1½
1	0000	2
0	250000	2
00	350000	2½
000	400000	2½
0000	550000	3
250000	600000	3
300000	800000	3
400000	1000000	3½
500000	1250000	4
600000	1500000	4
700000	1750000	4½
800000	2000000	4½

TRADE NOTES.

The California-Oregon Power Company is moving to the ground floor of the Annex of the Merchants National Bank building, San Francisco, where it will have much larger offices than at its former location.

The National Lamp Works, for the second successive year, is conducting a show window trimming contest among its distributors all over the country. Sixty prizes are offered ranging from a Ford touring car down to five dollars in cash. To every entrant in the contest a 32-page album entitled "How Sixty Window Experts Display National Mazdas" is being sent. This publication contains pictures of sixty of the best rims produced in last year's contest with reading matter emphasizing the features that lend selling value to each display.

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Knife Switches—250 Volts.	List.	Sell.
D. P. Entrance Switch	1.00	1.00
T. P. Entrance Switch	1.40	1.40
Porcelain Sub-Base.		
5 Amp., Surface, Concealed and Moulding	.05	.05
10 Amp., Surface, Concealed and Moulding	.06	.10
20-30 Amp., Surface, Concealed and Moulding	.15	.20
Low Voltage Release Switch, for A. C. or D.C. Motors—110 or 220 Volts A. C. or D. C.		
60 Amp., 3-P	20.00	20.00
100 Amp., 3-P	30.00	30.00
60 Amp., 2-P	16.00	16.00
100 Amp., 2-P	24.00	24.00
400 Volts, A. C.		
3-P.	34.00	26.00
2-P.	22.00	28.00

Add 10 per cent to list price for fusible switch. Prices are for front connections, plain finish. Steel box with hinged door for enclosing switch, add $1.50 net. D. T. Switch for Star Delta connection, add $2.50 net.

Time Limit Overload Switches for A. C. Motors—220 or 440 Volts A. C. or 230 D. C. Motors. Amp. Range.		
Up to 60 Amp., 3-P. (2 coils)	27.00	27.00
Up to 100 Amp., 3-P. (2 coils)	38.00	38.00
Up to 60 Amp., 2-P (1 coil)	20.00	20.00
Up to 100 Amp., 2-P. (1 coil)	30.00	30.00

Steel box with hinged door for enclosing switch, add $1.50 net. O. T. switch for Star Delta connections, add $2.50 net.

Automobile Switches.		
Style A. S. P	.50	.50
Style B. S. P	.65	.65
Style B. 3-Point	.75	.75
Style B., 3-Point, Removable Key	.85	.85
Style B., Removable Key	.75	.75
Style B., Sunken Plate	.75	.75
Style B., Sunken Plate, Removable Key	.85	.85
Switches—Motor Starter.		
30 Amp., D. P. D. T	4.12	4.50
60 Amp., D. P. D. T	5.50	5.50
30 Amp., T. P. D. T	5.50	5.50
60 Amp., T. P. D. T	7.30	7.30
30 Amp, F. P. D. T	6.68	6.75
60 Amp., F. P. D. T	8.40	8.40

The correctness of these suggested selling prices is not guaranteed by publisher. Suggestions for corrections are invited.

PUNCH HERE PUNCH HERE

Fold Here

PUNCH HERE PUNCH HERE

Journal of Electricity, Power and Gas
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Remote Control Switches.	List.	Sell.
30 Amp., D. P., not fused	8.00	8.00
60 Amp., D. P., not fused	12.00	12.00
100 Amp., D. P., not fused	24.40	24.40
200 Amp., D. P., not fused	32.00	32.00
400 Amp., D. P., not fused	74.80	74.80
600 Amp., D. P., not fused	98.60	98.60
30 Amp., T. P., not fused	10.75	10.75
60 Amp., T. P., not fused	15.00	15.00
100 Amp., T. P., not fused	31.40	31.40
200 Amp., T. P., not fused	41.70	41.70
400 Amp., T. P., not fused	95.30	95.30
600 Amp., T. P., not fused	118.40	118.40
1000 Amp., T. P., not fused	140.00	140.00
1200 Amp., T. P., not fused	160.00	160.00
2000 Amp., T. P., not fused	265.00	265.00
4000 Amp., T. P., not fused	494.00	494.00
Wood Screws, Per Gross.		
½ in. No. 5, F. H.	.78	.80
¾ in. No. 7, F. H.	.90	.90
¾ in. No. 8, F. H.	.95	.95
1 in. No. 8, F. H.	1.05	1.05
1 in. No. 9, F. H.	1.10	1.10
1¼ in. No. 9, F. H.	1.20	1.20
1½ in. No. 10, R. H. Blue	1.40	1.40
2 in. No. 10, R. H. Blue	1.75	1.75
1½ in. No. 14, R. H. Blue	2.00	2.00
2 in. No. 14, R. H. Blue	2.45	2.45
2½ in. No. 14, R. H. Blue	2.90	2.90
2½ in. No. 10, F. H. W.	2.40	2.40
3 in. No. 12, F. H. W.	3.30	3.30
Machine Screws, Per Gross.		
½ in. 6/32, Round or Flat Head	.39	.40
1 in. 6/32, Round or Flat Head	.55	.55
1½ in. 6/32, Round or Flat Head	.75	.75
2 in. 6/32, Round or Flat Head	1.15	1.15
2½ in. 6/32, Round or Flat Head	1.25	1.25
½ in. 10/24, Round or Flat Head	.70	.70
1 in. 10/24, Round or Flat Head	.90	.90
1½ in. 10/24, Pound or Flat Head	1.30	1.30
Nuts, Per 100.		
6/32 Iron	1.08	1.08
8/32 Iron	1.22	1.25
10/24 Iron	1.20	1.30
Window Reflector.		
Helmet	5.00	5.00
Scoop	3.50	3.50
Poke Bonnet	6.50	6.50

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